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ABSTRACT

The physical environment can measurably affect behavior and psychological well-being. This is critical in the case of older persons who are more environmentally vulnerable than the young due to limited financial resources and decreased mobility. A group of 91 elderly residents in multi-story private and public housing participated in this study. Specific design factors investigated were: type of housing, floor level, distance to elevators, number of bedrooms, length of corridor and position on corridor. These factors were examined in relationship to several theoretically-relevant dependent measures: social engagement, morale, physical and emotional health. Multiple regression analyses revealed several significant relationships. Living on short corridors was related to increased social interaction. Persons living at the ends of corridors were higher in morale. Proximity to elevators was positively related to the proximity of close friends. Home-owners and apartment-dwellers had more social roles and realtionships than persons living in rented houses. Findings suggest a human factors focus in architectural planning for the elderly. (Author)

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ARCHITECTURAL DESIGN CHARACTERISTICS OF PUBLIC HOUSING AND WELL - BEING OF THE ELDERLY

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INTRODUCTION

There is growing evidence that various physical factors in the environment affect psycho-social functions. If the buildings we inhabit have notable effects on the quality of our lives then this must be of particular significance to the growing number of our nation's elderly. It is arguable that older persons are more environmentally vulnerable than the young due to limited financial resources and decreased mobility. Also, they are more likely than most groups to live in institutional facilities over which they have little or no control. Thus psycho-social factors in the design of residences for the elderly become a serious question for environmental research. The following account highlights significant issues and research in this field of interior design.

Interior design, as a field of environmental research, has little history predating the last decade. Research in interior design received impetus from not only the needs of ecologically-minded social scientists but also from the empirical needs of engineers and architects, many of whom are increasingly attuned to human needs in their designs.

Lang and Moleski (1974) make the point that architects have come to recognize that the processes of human behavior are surprisingly stable and that it is not possible to design ideal systems without an understanding of how present systems function and malfunction. This need to add empirical data to subjective and aesthetic criteria is aided by the emphasis on experimental methodology in the behavioral sciences. When well-controlled research procedures are not used in architectural planning, we may have the following sequence described by Alexander (1964). When environmental dysfunction and irritation level accumulate to a toleration threshold, the designer may attempt a new, but sometimes inappropriate design. If no feedback on the alternative design follows, the residents may have to cope with new, and perhaps more serious environmental inadequacies. This can become a vicious circle. There is a clear necessity for systematic research involving information feedback loops to be incorporated into the design system.

The effects of interior design variables have been tested in a variety of settings including psychiatric wards, dormitories, toilets, libraries, offices, and schools. However, to date there is a dearth of specific research on the effects of residences for the elderly. Consequently it will be useful to review relevant research in several of the residential settings mentioned above. The purpose is to review the general evidence of the effects of interior design on behavior and to examine several specific design variables that are relevant to residences for the elderly.

Residential Settings

Dormitories. Since it has been found that students spend much of their spare time in dormitories, consideration of physical design factors assumed logical importance. Research has centered around the affect of physical design factors on privacy and social interaction.

Room arrangements in many college dormitories are criticized in that they fail to provide adequate privacy. In McDougall's words, the college student in his shared room "has no place where he can sit down in comfort with a book and a pipe and possess his soul in quietude...no place to express his taste and develop his personality (Heilweil, 1973, p. 380). This situation can lead to conflict, partially resolved with limited solutions such as staggered study and class schedules (Van der Ryn and

Silverstein, 1967). Corbett (1973) investigated the possible benefits of the suite over the shared room and found that satisfaction increased considerably, but only under the conditions of voluntary choice rather than random placement in the suites. Similarly it was found by Heilweil (1973) that dormitories with a straight-corridor design require too much interaction. This situation was avoided by suite arrangements, where only three or four rooms open into a small private lounge.

Festinger (1950) attempted a balance between privacy and opportunity for social interaction. Since traditional double loaded corridors (rooms on both sides) were found to be too noisy, later architectural arrangements separated the sides of the corridors with various service and study facilities. This, however, was found to provide too much isolation.

Heilweil (1973) suggested several improvements in dormitory design. Included would be "jog" corridors which would maintain social proximity while decreasing noise levels and increasing the privacy of traditional straight corridors. Moveable furniture would increase opportunity for personal expression. Sound-absorbing soft furnishings would reduce noise distraction. However, these suggestions remain largely intuitive and impressionistic, and empirical verification is needed.

Psychiatric Hospitals. In the mid-nineteenth century Kirkbride (1880) initiated a trend in small-scale, therapeutically-oriented psychiatric settings. This type of design was to be lost, in the name of "efficiency," to the new traditional, high population, long corridor designs (Griffin, Mauritzen and Kasmar, 1969). Spivak (1967) found that long straight corridors are detrimental to the patients' perception and behavior. He hypothesizes that they provide visual and auditory distortions that can cause anxiety in schizophrenic patients. Seatless toilets, security hardware and utilitarian furniture give an environmental "message" to patients that encourages and reinforces regression and lack of control (Stainbrook, 1966).

Srivastava and Good (1968) looked at patterns of group interaction in relationship to environmental characteristics. In three environmentally different psychiatric settings they found support for the hypotheses that, 1) interaction patterns will not be significantly different in similar ward environments and 2) interaction will be significantly different in different ward environments. Interaction was found to be more frequent in public active places (e.g. near windows with access to outside) rather than private-passive places. Another study (Ittleson et al., 1970) attempted to increase social interactions in the solarium of a psychiatric ward of a city hospital by providing comfortable, attractive and well arranged seating. The result showed the solarium increasing in its share of total activity among other public rooms from 25% to 42%, to the loss of corridor and dayroom activity levels. The results also give further support to the significant effects of seating arrangements on social behavior.

In a position paper, Osmond (1957) made the point that an architectural structure may precede behavioral function or be followed by it. He stressed that function will follow structure if it does not precede it, and urges that behavioral and architectural planners attend to the intended functions of a proposed building. (This is reminiscent of Winston Churchill's classic phrase: "We shape our buildings and then they shape us.") The previous study (Ittleson et al., 1970) illustrates an attempt to implement this concept; desired behavioral function (social interaction) was facilitated by appropriate structure changes (furniture arrangements).

The effects of visual aesthetics (typified in "beautiful" and "ugly" room conditions) on psychiatric patients were studied by Kasmar et al. (1968) and found that no significant changes in patient mood were attained in the two conditions. However, in another study (Minz, 1956) non-psychiatric subjects and examiners in a psychological testing situation were found to have significantly lower performance rates and greater exhaustion in the "ugly" room condition. This suggests that visual aesthetics may have noticeable behavioral effects when task-performance is added to the experimental situation. A person may be more affected by room color, for example, when he has to work and not just be present in a room.

Residential Settings for the Elderly. The literature on the effects of physical design variables in residential settings for the elderly has a short history. It is understandable that, with the increasing number of elderly and growing social concern, studies of physical environmental design of the type previously reviewed would be extended to the elderly.

It appears that the quality of residential environment should be of critical social concern since the environmental characteristics of residences may be more important predictors of adjustment than pre-residential personal characteristics. This was found to be so in a study of psychiatric patients after discharge (Liebermen et al., 1971); characteristics of the post-discharge environment were found to predict adjustment better than the pre-discharge personal characteristics such as coping style, mood and activity patterns.

Despite the importance of designing appropriate physical environments for an increasing population of the elderly, there have been few studies in this area. Most of the studies that do exist concern themselves with prosthetic aspects of the physical environment (McClannan, 1973). They deal with compensatory features for the physiologically aging person such as specially designed eating utensils (Peterson, 1971), handrails, ramps, automatic doors (Lowenberg, 1954; McGuire, 1971), etc. It is, of course, necessary to attend to these facilities. However, given the hypothesis that environment can affect physiological processes (Moos, 1974, it seems important to avoid the assumption that all such debilitation is related to intrinsic developmental changes. It may well be that physiological indices of health may be affected by manipulation of physical and social environmental variables.

In conclusion: While there is considerable empirical or descriptive evidence for the importance of interior design in dormitory and psychiatric settings, the evidence for the importance of interior design variables in residential settings for the elderly is little more than professional opinion. This lack of controlled studies provides part of the motivation for this study.

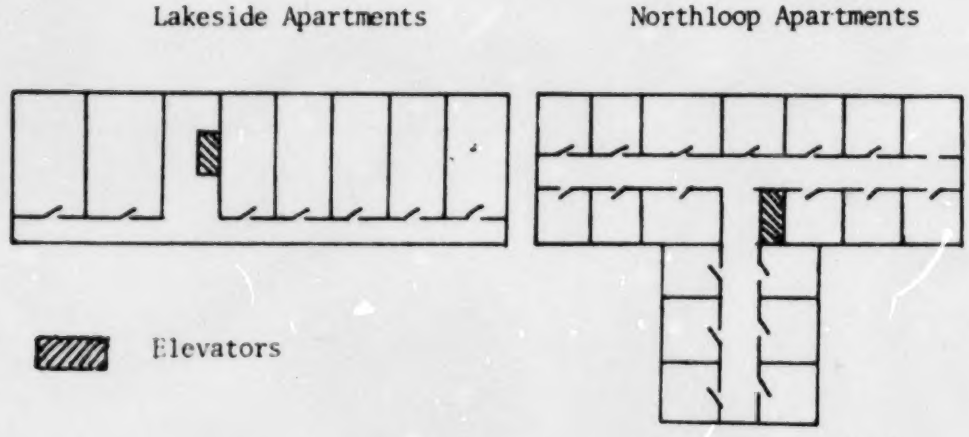
The present study investigated a series of specific design factors in public housing for the elderly. The effects of these factors on a series of dependent measures, such as engagement, morale, and health, was examined.

PROCEDURE

Subjects in the study lived in one of three physical settings. The first two of these were residences for the elderly provided by the housing authority in a city of 300,00 located in the Southwest.

The first is a twelve-story (high rise) building with 164 apartment units, Lakeside Apartments. It has independent cooking and dining facilities and communal utilities and recreational areas.

The second of these two buildings is a five-story (low rise) building with 130 apartment units, Northloop Apartments. Similarly it has independent cooking and dining facilities with communal utilities and recreational areas. In addition to a high rise versus low rise contrast, these two buildings differ in mode of access to apartments. Lakeside Apartments are entered from outside balconies whereas Northloop Apartments are entered from inside corridors. This difference is illustrated below:



Elevators provide access to all floors in both buildings.

The third physical setting was a range of rented or owned private housing.

The physical environmental variable was a series of six physical design factors: type of house, floor level, distance to elevator, number of bedrooms, length of corridor and position on corridor. Data consisted of a subject's disposition on each of the factors in this variable.

Subjects

A total of 171 persons aged 60 years or older served as subjects for the present study. All persons were ambulatory and suffered from no other incapacitating physical or sensory disabilities. Forty-five persons were residents in North Loop Apartments, forty-six were residents in Lakeside Apartments. An additional eighty persons lived in a variety of rented or owned private housing. All persons, either by regulation for public housing or membership in Action programs, were low income by SES classification. In the three settings average income ranged between $3,000 to $4,000 per annum.

Instrumentation

The Measures of Disengagement. Disengagement was measured by two indices of social interaction described by Cumming and Henry (1961). These are Social Lifespace and Role Count, measuring different dimensions of a person's social interaction.

The Health Measures. The Cornell Medical Index Health Questionnaire (Brodman, Erdmann, Lorge and Wolff, 1949) "was devised to meet the need for an instrument for collecting a large body of pertinent medical and psychiatric data at a minimal expenditure of the physician's time" (Brodman et al, 1949).

The General Health Score is derived from sections A to R, while the Emotional Health score is derived from sections M to R, Mood and Feeling Patterns. The Index has been used with a variety of groups and settings including the elderly (Steinhardt, 1953; Tuckman, 1954; Templer, 1971).

The Morale Measure. The Philadelphia Geriatric Center Morale Scale (Lawton, 1972) is a multidimensional measure of morale consisting of 22 items, most of which are in dichotomous response format. In a standardization study by Lawton (1975) the scale was found to have three stable and replicable factors: Agitation, Attitude Toward Aging and Lonely Dissatisfaction. For the purposes of this study, the total score only was examined.

RESULTS

The relationship of the physical environmental variables to the dependent measures was examined by analysis of variance (for nominal variables) and correlation analyses (for continuous variables). It was decided to treat floor level as a continuous variable, since analyzing by floor for analysis of variance yielded insufficient N per floor (cell) for statistical power.

Northloop Apartments

Table 1 presents F values and associated probabilities for the analyses of variance of the nominal physical variables on the dependent measures. A significant difference appears on the Long/Short Corridor variable, with regard to Social Lifespace ($F = 4.02$, $df = 1/22$, $p = .05$). Inspection of group means suggests that people living on the short corridor in Northloop Apartments have high Social LIfespace -- i.e., more extensive social interactions.

Lakeside Apartments

Table 2 gives F values and associated probabilities for analyses of variance for the nominal physical variables on the dependent measures. Results indicated a significant difference ($F - 5.10$, $df = 1/33$, p .05) between persons close and distant from the elevator with regard to the distance to their nearest close friends. Inspection of the respective means of the two groups in terms of distance from the elevator suggests that persons who are more distant from the elevator also have close friends who are further away in the building. Inversely stated, this may mean that people who are close to the social focal point an elevator provides have more social contact and therefore friends close at hand.

A significant difference ($F = 7.79$, $df = 1/42$, p .05) also appears on the Middle/End of Corridor variable with regard to Morale. Inspection of group mean differences indicates that people living at the ends of the Lakeside Apartment corridors are higher in morale than persons living in the middle of the corridors. Correlation coefficients between continuous physical environmental variables and the dependent measures are presented in Table 3. A significant correlation ($r = .35$, p .05) was observed between Distance to Elevator (measured continuously) and Nearest Friend. This result corresponds with the Distance to Elevator variable as analysed in nominal categories.

Noninstitutional Housing

Table 4 gives F values and associated probabilities for analyses of variance for this physical variable on the dependent measures. Significant differences appear on the Type of House variable (Own House, Rent House, Apartment) with regard to Role Count ($F = 4.65$, $df = 2/75$, p .05) and Number of Well-Known Neighbors ($F = 5.32$, $df = 2/75$, p .05).

CONCLUSIONS

The purpose of this study was to investigate the effects of physical environment on level of disengagement, morale and health in elderly people. Analyses revealed some significant relationships between the environmental variables and the dependent measures.

Several of the physical environmental variables were significantly related to dependent measures. Position on corridor was found to be important in that persons living at the ends of corridors were significantly higher in Morale than those living in the middle sections of corridors (Lakeside Group). Also persons who lived closer to elevators were significantly nearer to their close friends than persons more distant from elevators (Lakeside Group). This suggests the importance of elevators as centers and facilitators of social congregation. Corridor-type was found to be significantly related to Social Lifespace (Northloop Group); persons living on a short corridor revealed a greater amount of social interaction than those on long corridors. Type of House was related to Number of Well Known Neighbors and Role Count; Private home owners and apartment dwellers had significantly more social roles and relationships than persons living in rented houses.

These findings suggest that physical environmental characteristics may significantly affect the well-being of older people. This is all the more important since the elderly are probably more environmentally-bound than younger persons. The younger person may relocate if he finds his living environment to be inefficient or inadequate; the older person, often restricted by poor health, limited finances and even legal guardianship, cannot readily do so.

In no case was General Health significantly related to the environmental variables examined in this study. Further research must determine whether general health is affected by other environmental factors not examined here.

Further research is needed to test the general applicability of these findings beyond the setting investigated in this study. It will also be worthwhile to expand the scope of this research to other environmental factors.

TABLE 1

F VALUE AND ASSOCIATED PROBABILITIES FOR ANALYSIS OF VARIANCE OF NOMINAL PHYSICAL VARIABLES ON THE DEPENDENT MEASURES (NORTHLOOP GROUP)

Dependent Measure	Distance to Elevator		Middle /End Corridor		Long/ Short Corridor	
	F	p	F	p	F	p
Nearest Friend	.03	ns	1.17	ns	.03	ns
General Health	.09	ns	.35	ns	1.97	ns
Emotional Health	.52	ns	1.08	ns	1.33	ns
Social Lifespace	.06	ns	.30	ns	4.02	.05
Role Count	.60	ns	1.07	ns	.21	ns
Morale	.67	ns	2.10	ns	.82	ns
Number of Well-Known Neighbors	.24	ns	0.00	ns	1.29	ns
Amount of Contact	.00	ns	.09	ns	.24	ns

TABLE 2

F VALUES AND ASSOCIATED PROBABILITIES FOR ANALYSIS OF VARIANCE OF NOMINAL PHYSICAL VARIABLES ON DEPENDENT MEASURES

Dependent Measure	Distance to Elevator		Middle/End Corridor		Long/Short Corridor	
	F	p	F	p	F	p
Nearest Friend	5.10	.03	3.52	.07	.01	ns
Nearest Neighbor	1.20	ns	.00	ns	.63	ns
General Health	3.47	.07	.60	ns	.01	ns
Emotional Health	3.35	.07	.79	ns	.02	ns
Social Lifespace	.49	ns	.00	ns	.55	ns
Role Count	.04	ns	.22	ns	2.54	ns
Morale	.15	ns	7.79	.01	1.17	ns
Number of Neighbors	.32	ns	.78	ns	.35	ns
Amount of Contact	.70	ns	3.72	.06	1.92	ns

TABLE 3

CORRELATION COEFFICIENTS BETWEEN CONTINUOUS PHYSICAL VARIABLES AND DEPENDENT MEASURES (LAKESIDE GROUP)

	Floor Level	Size of Dwelling Number of Bedrooms	Distance to Elevator Continuous
Nearest Friend	.13	.15	.35*
Nearest Neighbor	-.12	-.15	-.19
General Health	-.03	.03	-.04
Emotional Health	-.04	.03	.09
Social Lifespace	-.12	.10	.02
Role Count	.04	.21	-.03
Morale	-.01	.13	.21
Number of Well-Known Neighbors	.21	.26	.19
Amount of Contact	-.06	.03	-.23

*Correlations significant at .05 level or better.

TABLE 4

F VALUES AND ASSOCIATED PROBABILITIES FOR ANALYSIS OF VARIANCE ON THE CATEGORIES OF THE NOMINAL PHYSICAL VARIABLE, TYPE OF HOUSE, ON DEPENDENT MEASURES (FOSTER GRANDPARENT GROUP)

	Type House	
	F	P
General Health	.99	ns
Emotional Health	2.31	ns
Social Lifespace	1.47	ns
Role Count	4.65	.01
Morale	1.01	ns
Number of Well-Known Neighbors	5.32	.01
Amount of Contact	2.95	ns

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